PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference JTS/CP/P13544PC	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/GB2004/002544	International filing date *(day/month/year)* 14.06.2004	Priority date *(day/month/year)* 12.06.2003

International Patent Classification (IPC) or national classification and IPC
B01D33/03, B07B1/46

Applicant
AXIOM PROCESS LIMITED et al.

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 5 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
11.01.2005	27.09.2005

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/GB2004/002544

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-13	as originally filed

Claims, Numbers

1-18	received on 14.01.2005 with letter of 10.01.2005

Drawings, Sheets

1/6-6/6	as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-18
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-18
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-18
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Items V. and VIII.

1. The following documents are referred to:
   D1 : US 6 530 482 B1 (WISEMAN MICHAEL D) 11 March 2003 (2003-03-11)
   D2 : US 4 446 022 A (HARRY ALAN) 1 May 1984 (1984-05-01)
   D3 : EP 1 088 582 A (TUBOSCOPE I P INC) 4 April 2001 (2001-04-04)
   D4 : DE 42 10 770 A (KAUFMANN FRIEDHELM) 7 October 1993 (1993-10-07)

2.1 Document D1 describes a basket 22 suitable for use in a vibratory screening apparatus 10 (shale shaker), for use in removing solids from a liquid and solids mixture feed, said basket mounting a stack of screen assemblies 14-18, with superposed screen assemblies 14,16;18,20 separated from each other by a respective flow directing tray 30 (flowback pan), and being provided with a flow distributor 36;26,28;32,34 formed and arranged for dividing the feed stream into a first feed stream and a second feed stream and directing said feed streams onto respective ones of first and second screen assemblies, and receiving filtrate from a respective screen assembly, from said respective flow directing tray (cf. column 3, line 15 - column 4, line 17).

2.2 The subject-matter of amended claim 1 differs from said basket in that the stack comprises at least three screen assemblies and that the flow distributor is formed and arranged for receiving filtrate from a primary upper screen assembly and for dividing said filtrate into at least a first and second feed stream.

2.3 It is understood that the technical problem to be solved by the present application is to improve the efficiency of a vibratory screening apparatus and thus of the applied basket in relation to the physical size thereof (cf. page 1, lines 13-15).

2.4 D1 discloses a tandem shale shaker comprising upper and lower screens. The shaker, normally operated in series, should also be suitable to be operated in parallel. According to D1, a distribution apparatus is set to selectively direct unscreened liquid to the lower screen. Further, D1 mentions flow directors which selectively direct screened liquid from the upper screen to the lower screen or away from the lower screen to the sump (cf. column 3, lines 22-25). D1 refers to a need to enhance the

capacity of a tandem shale shaker during high volume operations without increasing the space required by the shaker (cf. column 1, lines 60-63). Thus, the technical problem to be solved by D1 is similar to the object of the present application. However, D1 teaches a different solution of the problem.

2.5 Document D2 discloses a vibratory screening apparatus having a basket 10 mounting a stack of screening assemblies 54,56,58 (cf. embodiment of Figures 3 and 4). In order to handle higher throughput volume, the trays include adjustable weirs as flow control devices of flow distributors. Liquid collection trays 68,70 act as flow directing trays.

D2 as well as documents D3 and D4 give no lead to the solution of the technical problem as claimed in new claim 1.

2.6 It is therefore concluded that the subject-matter of new claim 1 fulfils the requirements of Art.33(2) and 33(3) PCT. The same applies to the dependent claims.

3. Art.6 PCT

3.1 The embodiments of Figures 2A,2B,5A; 3A,3B,5B; 9 and 10 do not fall under the scope of new claim 1 (Art.6PCT). Further, new claim 4 is in contradiction to new claim 1, since claim 4 is directed to an operation in series (Art.6PCT)..

3.2 Dependent claim 2 refers to "a basket ... mounted in a said vibratory screening apparatus, ..., said apparatus comprising ...". Thus, dependent claim 2 should be directed to vibratory screening apparatus for ..., said apparatus comprising ... and a basket according to claim 1..., rather than a basket (Art.6 PCT: clarity).

CLAIMS

1. A basket (4) suitable for use in a vibratory screening apparatus (1), for use in removing solids from a liquid and solids mixture feed, said basket (4) mounting a stack of at least three screen assemblies (8', 8''^{L}, 8'''), with superposed screen assemblies separated from each other by a respective flow directing tray (9, 31, 37), and being provided with a flow distributor (15, 24) formed and arranged for receiving filtrate from a primary upper screen assembly (8') and dividing said filtrate into at least a first feed stream and a second feed stream and directing said feed streams onto respective ones of first and second screen assemblies (8'', 8'''), and receiving filtrate from a respective screen assembly (8', 8''), from said respective flow directing tray(s).

2. A basket (4) according to claim 1, mounted in a said vibratory screening apparatus (1) for use in removing solids from a liquid and solids mixture feed, said apparatus comprising a static outer housing (2), said housing comprising: a base support (60) formed and arranged for mounting at least one said basket in floating manner so as to be vibratable, in use of the apparatus, by a vibrator device (10) formed and arranged for vibrating said basket (4), said base support (60) having a sump (56, 61) for receiving filtrate from said basket (4), and said housing (2) having a feed device (64) formed and arranged for directing said liquid and solids mixture feed to said basket (4) mounted in said base support (60).

3. A basket as claimed in claim 1 or claim 2 wherein said flow distributor (15) is formed and arranged so as to be switchable between a plurality of different flow directing configurations.

4. A basket as claimed in claim 3 wherein said plurality of flow directing configurations includes an intensive screening configuration in which the whole of the feed is directed onto said first screen assembly (8'', 36) and the whole of the filtrate from said first screen assembly (8'', 36) is directed onto said second screen assembly (8''', 46).

5. A basket as claimed in claim 3 or claim 4 wherein said plurality of flow directing configurations includes a restricted feed capacity configuration in which the whole of the feed is directed onto only one of said first and second screen assemblies (8'', 36, 8''', 46), and the filtrate therefrom exhausted directly from the apparatus (1) without passing through the other one said first and second screen assemblies (8'', 36, 8''', 46).

6. A basket as claimed in any one of claims 1 to 5 wherein said basket has a stack of three screen assemblies (8', 8'', 8''', 31, 36, 46).

7. A basket as claimed in any one of claims 1 to 6 wherein at least said primary screen assembly (8', 31) has a different mesh size from at least one other said screen assembly (8', 8'', 36, 46).

8. A basket as claimed in any one of claims 1 to 7 wherein said first and second screen assemblies (8', 8'', 36, 46) have the same mesh size.

9. A basket as claimed in any one of claims 1 to 8 wherein said flow distributor (15, 24) defines a plurality of flow pathways provided with flow control devices (20), for selective opening or, at least partial, closing of different passages (17, 18).

10. A basket as claimed in claim 9 wherein at least one said flow control device (20) is selected from flap valves (20', 20'', 20'''), sleeve valves, plug valves, and closure plates.

11. A basket as claimed in claim 9 or claim 10 wherein at least one said flow control device (20) is comprised by a weir (39), formed and arrange for sub-dividing a said feed into a said first feed stream passing over said weir and a said second feed stream not passing over said weir.

12. A basket as claimed in claim 11 wherein said weir (39) comprises a variable height weir.

13. A basket as claimed in any one of claims 9 to 12 wherein said flow distributor (15, 24) includes at least one wall (68) formed and arranged for defining a plurality of laterally adjacent flow pathways.

14. A basket as claimed in any one of claims 1 to 13 wherein the distributor (15) is mounted on the basket (4).

15. A basket as claimed in any one of claims 1 to 13 wherein the distributor (24) is coupled to the basket by flexible conduits (26).

16. A basket as claimed in claim 2 or any one of claims 3 to 15 when dependent on claim 2, wherein said basket (4) forms part of a multi-basket assembly comprising a plurality of said baskets, mounted in said static housing (2), and wherein said housing (2) has a feed distribution device (15) formed and arranged for directing said liquid and solids mixture feed to any one or more of said plurality of baskets.

17. A basket as claimed in claim 2 or any one of claims 3 to 15 when dependent on claim 2, wherein said basket (4) includes a lateral divider (68) defining independent feed processing modules (28, 29, 69, 70), and wherein said housing has a feed distribution device (71-74) formed and arranged for directing said liquid and solids mixture feed to any one or more of said basket feed processing modules (28, 29, 69, 70).

18. A basket as claimed in any one of claims 1 to 17 wherein said flow directing trays (9,31,37) are formed and arranged so that substantially the whole of the filtrate from a screen assembly (8) directly above said flow directing tray (9,31,37) can be intercepted thereby, whereby said feed can be substantially fully divided into parallel first and

second feed streams to respective ones of first and second screen assemblies (8',8").